

REMARKS

Claims 1-20 are pending. Applicants gratefully acknowledge the Examiners indication that Claims 4 and 14 comprise allowable subject matter, and would be allowable if rewritten as suggested in the Office Action. However, Examiner's reconsideration of the rejections is requested for the following reasons.

Claim Rejections 35 U.S.C. §102(e):

Claims 1-3, 5-13 and 15-20 are rejected under 35 U.S.C. §102(e) for the reasons stated on pages 2-3 of the Office Action as being anticipated by Langsford (US 2004/0027268), hereinafter "Langsford". Applicants respectfully traverse the rejections.

Applicants submit that at the very minimum claims 1, 5, 11 and 15 are patentably distinct and patentable over Langsford, since Langsford clearly fails to disclose or suggest various elements of such claims.

To demonstrate the clear difference between the claimed inventions and the teachings of Langsford, reference will be made to the exemplary embodiment of Figure 3 of Applicants' Specification, in comparison with the teachings Langsford's Figure 4, as relied on by the examiner.

To begin with, on a fundamental level, the subject matter of the claimed inventions relates to, demodulation systems and methods for wireless communication systems that eliminate fading interference for analog communication signals. In contrast, Langsford relates to interference suppression in radar systems based on reflected microwave signals, from non-target sources.

In particular, with regard to independent Claims 1 and 11, Applicants respectfully submit that Langsford fails to teach or suggest an apparatus or method for *receiving and*

converting sub-array group analog communications signals that are received via M antenna sub-array groups into digital input signals, multiplying the digital input signals by corresponding weighted vector elements, and summing the products for each sub-array group to generate M diversity beamforming signals as essentially claimed in Claims 1 and 11.

For example, Applicants Figure 3 depicts an exemplary embodiment of a wireless fading-channel demodulator (420), comprising *a receiving-processing portion* (410), which *receives and converts sub-array group analog communication signals* (e.g. extracted by RF Modules (310, 320, 330)) that are *received via M antenna sub-array groups* (210, 220, 230), into *digital input signals* (U_{11} - U_{1L} , U_{21} - U_{2L} , U_{M1} - U_{ML}). Then, *multiplying* (4113, 4123, 4133) *each of the digital input signals* (U_{11} - U_{1L} , U_{21} - U_{2L} , U_{M1} - U_{ML}) *by the corresponding weighted vector elements* (W_{11} - W_{1L} , W_{21} - W_{2L} , W_{M1} - W_{ML}), and *summing* (4115, 4125, 4135) *the products for each sub-array group* (210, 220, 230) *to generate M diversity-beamforming signals* (Z_1 , Z_2 , Z_M).

In comparison, as depicted in Figure 4 and described in paragraph 68-70, Langsford essentially teaches antenna sub-array groups ($Z_{1,1}$ - $Z_{1,k}$; $Z_{2,1}$ - $Z_{2,k}$, $Z_{q,1}$ - $Z_{q,k}$) that receive reflected microwave radiation. The signals from each individual antenna sub-array groups (e.g. $Z_{1,1}$ - $Z_{1,k}$) are amplified (610), attenuated (620) and phase shifted (630) before being *combined together*, by sub-array combiners (640, 650, 660), to form combined microwave signals (F_1 - F_q). These signals are then input into receivers (670, 680, 690), which extract base-band signals from each combined microwave signals (F_1 - F_q). These base-band signals are then sent to analog-to-digital converters (710, 720, 730) and converted to corresponding digital signals. These digital signals are sent through a

coupler (30) creating data signal (D_0). Data signal (D_0) is sent to a Data Store (410) for storage and to a fixed beam forming network (700). The fixed beam forming network combines data signal (D_0) to create a data signal (D_1) corresponding to a narrow main beam polar response of the receiving antenna 45.

Thus, Langsford does not teach converting each of the *sub array group analog communication signals* as essentially claimed in Claims 1 and 11. Langsford teaches first combining the individual signals for each antenna sub-array group into a single combined microwave signal and then extracting its combined base-band signal, which is then digitized. Langsford does not teach or suggest the extraction of each of the individual *analog communications signals* from the signals received *via the M antenna sub-array groups into digital input signals*, as essentially claimed in Claims 1 and 11.

Moreover, Langsford fails to teach or suggest, *multiplying each of these digital input signals by corresponding weighted vector elements and summing the products for each sub-array group to generate M diversity beamforming signals*, as is essentially claimed in Claims 1 and 11. At the very least, Langsford teaches combining the signals from each individual antenna sub-array group before digitizing, as such the coupled digital signals used by Langsford are different from the *digital input signals* as essentially claimed. Even assuming arguendo, that Langsford's coupled digital signals were construed as *digital input signals* as claimed, Langsford still fails to teach or suggest the above recited element as essentially claimed in Claims 1 and 11. Langsford teaches storing the digital signals in a Data Store and sending it to a fixed beam forming network. In the fixed beam forming network, the digital data are combine to form a new data signal corresponding to a narrow main beam polar response of the receiving antenna. In

any event, Langsford does not teach or suggest *multiplying each of these digital input signals by corresponding weighted vector elements and summing the products for each sub-array group to generate M diversity beamforming signals*, as is essentially claimed in Claims 1 and 11.

Further, Applicants respectfully submit that Langsford fails to teach or suggest an apparatus or method *which multiplies the magnitude and phase of a representative digital input signal for each of the M sub-array groups by the corresponding one of the M diversity-beamforming signals and outputs the M products, summing the M products to produce a final output signal* as essentially claimed in Claims 1 and 11.

As depicted in Figure 4 and described in paragraphs 69-71, Langsford essentially teaches sending the output (D_0) of the analog to digital converters (710, 720, 730) to the output vector multiplier unit (420), via the Data Store (410) and connection (D_4). The weight calculation unit (430) calculates the vector multiplication coefficients (D_5) using standard beam nulling algorithms for steering nulls in the polar response of the receiving antenna (45). The output vector multiplier (420) then multiplies these vector multiplication coefficients (D_5) to the data (D_0) to produce the Corrected output P_0 .

Thus, Langsford uses "standard beam nulling algorithms..." to calculate the vector multiplication coefficients used to calculate the final output, and not the *magnitude and phase of a representative input digital signal*, as essentially claimed by Claims 1 and 11.

It is respectfully submitted that, in light of the discussion above, the Office Action at the very least incorrectly characterizes Langsford's Output vector multiplier unit (420) as multiplying the digital input signals by corresponding weighted vector elements, and

summing the product for each sub array group to generate M diversity beamforming signals. As discussed earlier the vector multiplier unit (420) produces only one Corrected output P_0 . Langsford teaches, in paragraph 71, that the output P_0 corresponds to a narrow beam polar response of the receiving antenna 45 in which nulls have been steered in the direction of interfering sources in the scene "S". This output is clearly not M diversity beamforming signals.

Therefore, Langsford fails to teach or suggest every element of Claims 1 and 11, for at least the reasons stated above.

With regard to independent Claims 5 and 15, Langsford fails to teach or suggest a system or method for *the extracting of analog communication signals from received wireless signals and outputting the extracted analog communication signals as sub-array group analog communication signals* as essentially claimed in Claims 5 and 15 for at least the reasons cited above with regard to Claims 1 and 11.

Further, Langsford fails to teach or suggest a system or method for *wireless fading-channel demodulation that receives and converts the sub-array group analog communication signals into digital input signals, generates M diversity-beamforming signals using the digital input signals and weighted vector elements and outputs a final output signal by using the magnitude and phase of a representative digital input signal selected for each of the M sub-array groups and a corresponding one of the M diversity-beamforming signals* as essentially claimed in Claims 5 and 15 for at least the reasons cited above with regard to Claims 1 and 11.

It is respectfully submitted that, in light of the discussion above, the Office Action at the very least incorrectly characterizes Langsford's ADC 710 as a radio frequency

module unit that extracts analog communication signals. As discussed earlier Langsford's element 710 is an analog-to-digital converter that digitizes analog signals. This is clearly not a radio frequency module unit.

Thus, Langsford fails to teach or suggest every element of Claims 5 and 15, for at least the reasons stated above.

Therefore, Langsford is legally deficient to establish a prima facie case of anticipation against the independent Claims 1, 5, 11 and 15, as Langsford fails to teach or suggest every element of the subject matter that is claimed. Moreover, the claims 2-4, 6-10, 12-14 and 16-20 are patentably distinct over Langsford, by virtue of their dependence from independent Claims 1, 5, 11, or 15, in the very least.

Accordingly Applicants request respectfully withdrawal of the rejections under 35 U.S.C. § 102(e)

All issues raised by the Examiner having been addressed; reconsideration of the rejections and objections, and an early and favorable allowance of this case is earnestly solicited

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